Patent Claims

1. A method of operating a wiper system (10), in particular a counter-rotation or butterfly wiper system, comprising at least two motor units (22, 24) which can be driven independently of one another and are coupled to wiper arms (18) for holding wiper blades (14, 16), a controller (26) for controlling the motor units (22, 24), and sensor units (28, 32 and 30, 34) for determining the angular position (φ_1, φ_2) of the wiper blades (14, 16), said sensor units being connected to the controller (26), characterized in that the wiping angles (α_1, α_2) of the wiper blades (14, 16) lie within various angle zones (Z_1, Z_2, Z_3, Z_4), wherein on the one hand the angle zone (Z_1, Z_2, Z_3, Z_4) within which the respective wiper blade (14, 16) is located is determined by means of an absolute sensor (30) and on the other hand the angle (δ_1, δ_2) of the wiper blade (14, 16) within the respective angle zone (Z_1, Z_2, Z_3, Z_4) is determined by means of a relative sensor (32, 34).

2. The method as claimed in claim 1, characterized in that, when the wiper blades (14, 16) cross from one angle zone (Z_1, Z_2, Z_3, Z_4) to a neighboring angle zone (Z_1, Z_2, Z_3, Z_4), the angle (δ_1, δ_2) within the second angle zone (Z_1, Z_2, Z_3, Z_4) is reset.

3. The method as claimed in claim 1 or 2, characterized in that, when the wiper system (10) and/or the vehicle is started, it is determined in which angle zone (Z_1, Z_2, Z_3, Z_4) the respective wiper blade (14, 16) is located, and in that, starting from

the respective angle zone (Z_1, Z_2, Z_3, Z_4), control sequences are stored in the controller (26) which control the motor units (22, 24) in such a way that the wiper blades (14, 16) are moved into a respective neighboring angle zone (Z_1, Z_2, Z_3, Z_4) without any collision between them.

4. The method as claimed in claim 3, characterized in that the control sequences move the wiper blades (14, 16) in such a way that they are guided into a parked position (PS).

5. A wiper system (10), in particular a counter-rotation or butterfly wiper system, comprising at least two motor units (22, 24) which can be driven independently of one another and are coupled to wiper arms (18) for holding wiper blades (14, 16), a controller (26) for controlling the motor units (22, 24), and sensor units (28, 32 and 30, 34) for determining the angular position (φ_1, φ_2) of the wiper blades (14, 16), said sensor units being connected to the controller (26), characterized in that the wiper system (10) is suitable for carrying out the method as claimed in any of claims 1 to 4.

6. The wiper system (10) as claimed in claim 5, characterized in that each wiper arm (18) is provided with a sensor unit (28, 32 and 30, 34) which has an absolute sensor (28, 30) for determining the respective angle zone (Z_1, Z_2, Z_3, Z_4) and a relative sensor (32, 34) for determining the angle (δ_1, δ_2) within an angle zone, wherein the boundaries between in each case two neighboring angle zones form reference points for the relative sensor (32, 34).

7. The wiper system (10) as claimed in claim 5 or 6, characterized in that the absolute sensors (28, 30) detect the angle zones (Z_1, Z_2, Z_3, Z_4) at the pivot axles (20) of the respective wiper arms (18).

8. The wiper system (10) as claimed in claim 5, 6 or 7, characterized in that the absolute sensor (28, 30) is a digital magnetic field sensor which comprises a magnet wheel (36) arranged on the pivot axle (20), which magnet wheel is scanned by at least two sensor elements (H_1, H_2) arranged offset with respect to one another.

9. The wiper system (10) as claimed in any of claims 5 to 8, characterized in that the arrangement, number and size (θ_N, θ_S) of the angle sections (38, 40) of the polarities of the magnet wheel (36) and the number and angular spacing (θ_H) of the magnetic field sensors (H_1, H_2) is adapted to the wiping angle (α_1, α_2) of the respective wiper blade (14, 16).

10. The wiper system (10) as claimed in any of claims 5 to 9, characterized in that the relative sensor (32, 34) detects the rotational speed of the motor shaft upstream of a gear transmission (G_1, G_2).

11. The wiper system (10) as claimed in any of claims 5 to 10, characterized in that the relative sensor (32, 34) is an incremental, digital magnetic field sensor.

12. The wiper system (10) as claimed in any of claims 5 to 11, characterized in that the wiping angles

(α_1, α_2) of the wiper blades lie in each case in at least three and preferably four angle zones (Z_1, Z_2, Z_3, Z_4).

13. The wiper system (10) as claimed in any of claims 5 to 12, characterized in that the respective angle range (α_1, α_2) in which a collision is possible is divided into preferably three angle zones (Z_1, Z_2, Z_3).

14. The wiper system (10) as claimed in any of claims 5 to 13, characterized in that in the controller (26) the angle zones (Z_1, Z_2, Z_3, Z_4) of the various wiper blades (14, 16) are depicted in a matrix, wherein in each case one angle zone of one wiper blade and one angle zone of another wiper blade form one field (x,y, with x = 1..4 and y = 1..4) of the matrix.

15. The wiper system (10) as claimed in claim 14, characterized in that the collision area (46) of the wiper blades (14, 16) is superposed on the matrix.

16. The wiper system (10) as claimed in claim 14 or 15, characterized in that the fields (x,y) which are passed through by boundary lines (48, 50) of the collision area (46) are passed through by a boundary line (48, 50) only once.

17. The wiper system (10) as claimed in claim 14, 15 or 16, characterized in that the collision area (46) is covered by a total of nine fields (x,y) with x = 1, 2, 3 and y = 1, 2, 3.

18. The wiper system (10) as claimed in any of claims 14 to 16, characterized in that control

sequences are stored which, starting from any point (P_1, P_2, P_3, P'_3) within a field (x,y), move the wiper blades (14, 16) into a neighboring field (x,y) without passing through the collision area (46).